UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/855,073	05/14/2001	David Tucker	37357.0100	8589

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EXAMINER
HENEGHAN, MATTHEW E

ART UNIT	PAPER NUMBER
2134	

DATE MAILED: 04/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	09/855,073	TUCKER ET AL.
	Examiner	Art Unit
	Matthew Heneghan	2134

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>02 March 2006</u>.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-57</u> is/are pending in the application.

    4a) Of the above claim(s) <u>11,13-20,24-42,46,47 and 54-57</u> is/are withdrawn from consideration.

5)☒ Claim(s) <u>12 and 21-23</u> is/are allowed.

6)☒ Claim(s) <u>1-10,43-45 and 48-53</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>29 December 2005</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1.   A request for continued examination under 37 CFR 1.114, including the fee set

forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this

application is eligible for continued examination under 37 CFR 1.114, and the fee set

forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action

has been withdrawn pursuant to 37 CFR 1.114. Applicant's submissions filed on 29

December 2005 and 2 March 2006 have been entered.

2.   In response to the previous office action, claims 1, 10, 12, 21-23, 48, and 53

have been amended. Claims 1-10, 12, 21-23, 43-45, and 48-53 have been examined.

Drawings

3.   The drawings were received on 29 December 2005. These drawings are

acceptable.

Specification

4.   The specification is objected to as failing to provide proper antecedent basis for

the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction

of the following is required: The limitation "...each candidate isomorph code functioning

in substantially the same manner as...," as recited in several of the independent claims

is not supported by the specification. The specification only teaches to code that is

functionally isomorphic (see the examples in figure 10, for example, wherein multiple

alternative isomorphs that do not function in substantially the same manner are

presented for each of several functions), which does not necessarily function in

substantially the same manner.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5.   Claims 1-10, 43-45, and 48-53 are rejected under 35 U.S.C. 112, first paragraph,

as failing to comply with the written description requirement. The claims contains

subject matter which was not described in the specification in such a way as to

reasonably convey to one skilled in the relevant art that the inventor(s), at the time the

application was filed, had possession of the claimed invention. Applicant's original

disclosure only teaches to the use of code that is functionally isomorphic, rather than

code that functions in substantially the same manner, as is being recited in each of the

independent claims. Each of these claims is being examined by ignoring the limitation

introduced by the new matter.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6.   Claims 1-4 and 6-10 are rejected under 35 U.S.C. 103(a) as being unpatentable

over WIPO Patent Publication No. 99/01815 to Collberg et al. in view of U.S. Patent No.

6,480,959 to Granger et al.

Note: Granger was made of record in the office action mailed 20 May 2005.

As per claims 1 and 10, the system disclosed by Collberg takes compiled code

and obfuscates (i.e. creates isomorphic code) it in a random manner when possible. In

order to determine when obfuscation is possible, the code must be scanned (see

abstract; p. 53, line 21 to p. 55, line 16; and p. 68 line 14 to p. 69, line 9). Collberg

further discloses a set of isomorphic functions with which to replace the original

functions (the example draw from the set of obfuscating transformations on p. 87, lines

6-7), and states that, in choosing the entry, "any number of heuristics can be used to

select the most suitable transformation to apply to a particular source code object." (see

p. 90, lines 17-19).

Collberg does not disclose the random selection from the set of isomorphic

codes.

Granger discloses the random selection of functions from a set of rules if more

than one rule exists that can be applied to a piece of code (see column 21, lines 44-46

and column 22, lines 13-15), and suggests this makes it possible for many different

software companies to use the same or similar obfuscation tools (see column 20, lines

52-59).

Therefore it would have been obvious to one of ordinary skill in the art at the time

the invention was made to modify the invention of Collberg by randomly selecting an

obfuscation to be applied, as disclosed by Granger, to make it possible for many

different software companies to use the same or similar obfuscation tools.

As per claims 2 and 3, Collberg further discloses the combining of multiple types

of transformations (at least three types are disclosed), thus creating later generation

isomorphs (see p. 53, lines 10-19 and p.86, line 27 to p. 89, line 22).

As per claim 4, Collberg discloses the generation of different obfuscated versions

of a program for different customers (see p. 98, lines 24-30).

As per claim 6, Collberg discloses Java® applications, which are generated at a

server and executed on a client (see entire document).

As per claim 7, Collberg discloses the insertion of inert (benign) code (see p. 42,

lines 4-27).

As per claims 8 and 9, the system is implemented on a stand-alone system

called "Kava," which may optionally use libraries (see p. 4, lines 13-15 and p. 25, line 25

to p. 26, line 15).

7.   Claims 1 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over

U.S. Patent No. 5,696,822 to Nachenberg in view of U.S. Patent No. 6,480,959 to

Granger et al.

Nachenberg discloses that a polymorphic virus (i.e. self-replicating code)

provides each new file with a mutated (obfuscated) version of the virus, as this

frustrates most standard virus-detection schemes (see column 1, lines 11-17).

Nachenberg does not disclose the random selection from a set of isomorphic

codes.

Granger discloses the random selection of functions from a set of rules if more

than one rule exists that can be applied to a piece of code (see column 21, lines 44-46

and column 22, lines 13-15), and suggests this makes it possible for many different

software companies to use the same or similar obfuscation tools (see column 20, lines

52-59).

Therefore it would have been obvious to one of ordinary skill in the art at the time

the invention was made to modify the invention of Nachenberg by randomly selecting an

obfuscation to be applied, as disclosed by Granger, to make it possible for many

different software companies to use the same or similar obfuscation tools.

8.   Claims 48, 49, and 51-53 are rejected under 35 U.S.C. 103(a) as being

unpatentable over U.S. Patent No. 6,006,328 to Drake further in view of U.S. Patent No.

6,480,959 to Granger et al.

Regarding claims 48 and 49, Drake discloses the insertion of obfuscating code,

which is isomorphic, in appropriate places. Scanning the code is necessary to

determine such places (see column 5, line 37 to column 6, line 3). Drake also discloses

the encryption of code after obfuscation, and notes that the encryption scheme used

can be subjected to substantial variation (see column 16, lines 3-9).

Drake does not disclose the use of random algorithms.

Granger discloses the random selection of functions from a set of rules if more

than one rule exists that can be applied to a piece of code (see column 21, lines 44-46

and column 22, lines 13-15), and suggests this makes it possible for many different

software companies to use the same or similar obfuscation tools (see column 20, lines

52-59).

Therefore it would have been obvious to one of ordinary skill in the art at the time

the invention was made to modify the invention of Collberg by randomly selecting an

obfuscation to be applied, as disclosed by Granger, to make it possible for many

different software companies to use the same or similar obfuscation tools.

Regarding claim 51, Drake discloses a symmetric algorithm, DES, as an

exemplary encryption algorithm; the combination of Drake and Granger therefore would

offer a symmetric algorithm.

Regarding claim 52, the invention of Drake is intended for try-before-you-buy

software (see column 3, lines 1-6).

Regarding claim 53, Drake discloses the use of a signature key (a checksum)

which prevents the successful decryption if the code has been tampered with (see

column 16, lines 44-48).

9.   Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S.

Patent No. 6,006,328 to Drake further in view of U.S. Patent No. 6,480,959 to Granger

et al. as applied to claim 48 further in view of U.S. Patent No. 5,966,450 to Hosford et

al.

Drake and Granger do not disclose the usage of a previous result for key

generation.

Hosford discloses the results from previous iterations to generate keys (see

column 5, lines 43-55), and further suggests that this increase the difficulty of

unauthorized decryption (see column 4, lines 5-11).

Therefore it would be obvious to one of ordinary skill in the art at the time the

invention was made to modify the invention of Drake and Granger by using the results

from previous iterations to generate keys, as disclosed by Hosford, as this increase the

difficulty of unauthorized decryption.

Allowable Subject Matter

10.   Claims 12 and 21-23 are allowed.

11.   The following is an examiner's statement of reasons for allowance: Though

Granger also discloses obfuscation using original CPU instructions, the matchable data

structure ("rules" in Granger) is not randomly generated during the initialization of the

application, and no art could be found in which this would be the case.

12.   Claims 43-45 would be allowable if rewritten to overcome the rejection(s) under

35 U.S.C. 112, 1st paragraph, set forth in this Office action and to include all of the

limitations of the base claim and any intervening claims, for the reasons stated in the

previous office action.

13.   Any comments considered necessary by applicant must be submitted no later

than the payment of the issue fee and, to avoid processing delays, should preferably

accompany the issue fee. Such submissions should be clearly labeled "Comments on

Statement of Reasons for Allowance."

Response to Arguments

14.   Applicant's arguments with respect to claim 1 et al. have been considered but are

moot in view of the new grounds of rejection. It appears that the amendments

introduced to claim 1 et al. teach to matter that is more closely related to Granger than

to Venkatesan, which was cited previously. The grounds of rejection are therefore being changed.

15.   Applicant's arguments, see Remarks, filed 2 March 2006, with respect to claims 12 and 21-23 have been fully considered and are persuasive in view of Applicant's amendments. The rejections of claims 12 and 21-23 have been withdrawn.

Conclusion

16.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

17.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew E. Heneghan, whose telephone number is (571) 272-3834. The examiner can normally be reached on Monday-Friday from 8:30 AM - 4:30 PM Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jacques Louis-Jacques, can be reached at (571) 272-6962.

Any response to this action should be mailed to:
Commissioner of Patents and Trademarks
P.O. Box 1450
Alexandria, VA 22313-1450
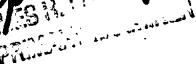**Or faxed to:**
(571) 273-3800

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MEH

April 25, 2006